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Effectiveness of *Zygogramma bicolorata* as a biocontrol agent against *Parthenium hysterophorus* in Arusha, Tanzania

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Effectiveness of *Zygogramma bicolorata* as a biocontrol agent against *Parthenium hysterophorus* in Arusha, Tanzania

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Abstract

Parthenium hysterophorus is an invasive weed that poses significant threats to crop production, biodiversity, human and animal health. Few experiments have been carried out to test the effectiveness of biological control agents such as the beetle *Zygogramma bicolorata* against this invasive. We released *Z. bicolorata* beetles as bio-agent to control *P. hysterophorus* at the Tropical Pesticides Research Institute in Arusha, Tanzania, across two seasons, from February – July 2019 (wet) and August 2019 – January 2020 (dry). Feeding by *Z. bicolorata* reduced *P. hysterophorus* leaves, flowers, height as well as biomass, both in the dry and wet season. During the wet season, 100% of all *P. hysterophorus* leaves were eaten already 28 days after the onset of the experiment, particularly under the highest beetle population treatment (30 individuals). *Parthenium hysterophorus* flower numbers were greatly reduced under high beetle populations (30 individuals) compared to the control treatment (0 individuals) during both the wet and dry season. *Parthenium hysterophorus* height was reduced by 87% and 90% during the wet and dry season, respectively when 30 beetles were released. Similarly, biomass was reduced by 90% and 87% during the wet and dry season, respectively. *Parthenium hysterophorus* responses to beetle treatments did not differ significantly across seasons but the development of both the invasive and its control, *Z. bicolorata*, was slightly delayed in the dry season. We conclude that *Z. bicolorata* can be used as bio-agent to manage *P. hysterophorus* in Tanzania, particularly when released in large numbers.

KEYWORDS: Biological control, beetles, famine weed, biomass, Eastern Africa